63d Congress, 2d Session. | HOUSE OF REPRESENTATIVES. | Document No. 1109.

BROADKILL RIVER, DEL.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE CHIEF OF ENGINEERS, REPORTS ON PRELIMINARY EXAMINATION AND SURVEY OF BROADKILL RIVER, DEL.

July 2, 1914.—Referred to the Committee on Rivers and Harbors and ordered to be printed, with illustration.

War Department,
Washington, June 30, 1914.

The Speaker of the House of Representatives.

Sir: I have the honor to transmit herewith a letter from the Chief of Engineers, United States Army, dated June 29 instant, together with copies of reports from Maj. R. R. Raymond, Corps of Engineers, dated April 30 and December 11, 1913, with map, upon a preliminary examination and survey, respectively, of Broadkill River, Del., made by him in compliance with the provisions of the river and harbor act approved March 4, 1913.

Very respectfully,

Lindley M. Garrison,
Secretary of War.

War Department,
Office of the Chief of Engineers,
Washington, June 29, 1914.

From: The Chief of Engineers, United States Army.
To: The Secretary of War.
Subject: Preliminary examination and survey of Broadkill River, Del.

1. There are submitted herewith, for transmission to Congress, reports dated April 30 and December 11, 1913, with map, by Maj. R. R. Raymond, Corps of Engineers, on preliminary examination

and survey, respectively, of Broadkill River, Del., authorized by the river and harbor act approved March 4, 1913.

2. The Broadkill River, formerly known as Broadkiln River and Broadkill Creek, has been under improvement by the United States since 1872. The present project adopted by the river and harbor act approved March 2, 1907, provides for dredging a new mouth for the river 6 feet deep at mean low water and 150 feet wide, protected by a jetty on the north side. Maintenance of the channel from Milton to the mouth, obtained under an earlier project, is also included. Owing to the sand movement along the shore of Delaware Bay, there is a tendency to shoal at the mouth of the river, and the project channel depth is not always available. The importance of securing a permanent entrance at the mouth of the Broadkill has been enhanced by the adoption of a project for an inland waterway connecting Rehoboth Bay and Delaware Bay, the northern end of which enters Broadkill River just above its mouth. The district officer proposes a plan of improvement contemplating the extension of the north jetty 400 feet, construction of a south jetty 1,600 feet long, construction of a sand fence 200 yards long, and dredging a channel 6 feet deep and 100 feet wide on bottom up to Lewes River. The total estimated cost of this project as given in supplemental report of May 28, 1914, by Maj. E. N. Johnston, Corps of Engineers, is $60,000, but it is proposed at present to construct the south jetty to a length of 500 feet only, thus reducing the immediate cost to $26,840. The district officer believes that the locality is worthy of improvement to this extent, keeping in view the probability of an extension of the south jetty to a length of 1,500 or 1,600 feet. The division engineer concurs in the views of the district officer.

3. These reports have been referred, as required by law, to the Board of Engineers for Rivers and Harbors, and attention is invited to its report herewith, dated June 16, 1914. The board states that the tentative work done heretofore has not proved successful nor of material advantage, and it is of opinion that it is advisable to adopt a project which will give reasonable assurance of ultimate success. It therefore recommends the adoption of the complete plan outlined by the district officer at an estimated cost of $60,000.

4. After due consideration of the above-mentioned reports, I concur with the views of the Board of Engineers for Rivers and Harbors, and therefore report that the further improvement by the United States of Broadkill River, Del., is deemed advisable under a plan providing for the extension of the north jetty 400 feet, construction of a south jetty 1,600 feet long, construction of a sand fence 200 yards long, and dredging a channel 6 feet deep at mean low water and 100 feet wide on bottom up to Lewes River at an estimated cost of $60,000. The first appropriation should be $26,840 to cover the work now proposed by the district officer, with subsequent appropriations so as to complete the project in three years.

Dan C. Kingman,
Chief of Engineers, United States Army.

REPORT OF THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS ON SURVEY.

[Third indorsement.]

BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
June 16, 1914.

To the CHIEF OF ENGINEERS, UNITED STATES ARMY:

1. The following is submitted in review of the district officer's reports of preliminary examination and survey of Broadkill River, Del., called for by the act of March 4, 1913.

2. The present project for this river provides for the establishment of a permanent entrance at the mouth of the river by dredging a channel from the 6-foot curve in the Delaware Bay to the same depth in the river and constructing a jetty on the north side of this channel, together with the maintenance of a 6-foot channel in the river up to Milton provided under a previous project. There has been expended on this river approximately $93,000. The existing project has been completed, and the river is reported to be in good condition except at the mouth.

3. The importance of securing a permanent entrance at the mouth of the Broadkill has been enhanced by the adoption of a project for an inland waterway between Rehoboth Bay and Delaware Bay by the act of July 25, 1912, at an estimated cost of $356,000. This waterway is to connect with the Broadkill River just inside its mouth, and it is expected that when completed it will provide considerable commerce.

4. The latest commercial statistics for the Broadkill give a commerce of 10,929 tons, having a value of about $320,000.

5. Owing to the sand movement along the shore, there is a tendency to shoal at the mouth of the river, and the projected channel depth is not always available. To secure a more permanent and reliable entrance the district officer proposes a present extension of the north jetty 400 feet, the building of a south jetty 500 feet long, the construction of a sand fence, and the dredging of the river mouth, at a total estimated cost of $26,840. He believes the work outlined above will produce a decided improvement, but that the project to be adopted should provide for further extensions as funds become available. The division engineer concurs in the views of the district officer.

6. Experience with the mouth of the Broadkill shows that it is impracticable under the existing project to secure a permanent and stable channel of the projected depth. The board agrees with the district officer and the division engineer that some additional work with this end in view is advisable in the interests of general commerce and navigation. The plan proposed by the district officer leaves the question of the ultimate expenditure somewhat uncertain. Believing that a specific project covering all work that may reasonably be expected should be presented, the board has secured an estimate on that basis, as follows:

1,600 linear feet of south jetty, at $25	$40,000
400 linear feet extension to north jetty, at $24	9,600
200 yards sand fence, at $1.50	300
Dredging 30,000 cubic yards of material from the mouth to Lewes River, at 15 cents	4,500
	54,400
Add for engineering and contingencies	5,600
	60,000

7. The tentative work done heretofore has not proved successful or of material advantage, and the board is of opinion that it is advisable to adopt a project which will give reasonable assurance of ultimate success. It recommends, therefore, that the project provide for the construction of a south jetty 1,600 feet in length, a 400-foot extension of the north jetty, the construction of sand fences, and dredging to secure a 6-foot depth, at a total estimated cost of $60,000, the first appropriation to be $26,840 to cover the work now proposed by the district officer, and subsequent appropriations to be so made as to complete the project in three years.

8. In compliance with law, the board reports that there are no questions of terminal facilities, water power, or other subjects so related to the project proposed that they may be coordinated therewith to lessen the cost and compensate the Government for expenditures made in the interests of navigation.

For the board:

Frederic V. Abbot,
Colonel, Corps of Engineers,
Senior Member Present.

PRELIMINARY EXAMINATION OF BROADKILL RIVER, DEL.

United States Engineer Office,
Wilmington, Del., April 30, 1913.

From: The District Engineer Officer.
To: The Chief of Engineers, United States Army
(Through Division Engineer).
Subject: Preliminary examination of Broadkill River, Del.

1. In compliance with department letter of March 18, 1913, I submit the following report:

2. The river and harbor act of March 4, 1913, provides for a preliminary examination as follows: Broadkill River, Del.

3. I have examined this locality on several occasions at different stages of the tide, the last examination being for the purpose of preparing this report. Examinations have also been made under my direction by Mr. G. W. T. Miller, assistant engineer, from whose report are quoted the following extracts:

> 4. The Broadkill River, known until 1889 as Broadkiln River and Broadkill Creek, has been under improvement by the United States Government since 1872.
>
> The existing project for improvement is based upon a preliminary examination and survey in 1905 and 1906, reports thereon constituting House Document No. 214, Fifty-ninth Congress, second session.
>
> The project submitted in 1906 provided for dredging a new mouth for the river 6 feet deep, protected by jetties on both sides of the entrance, and dredging a channel 5 feet deep and from 50 to 75 feet wide from inside of the new mouth to Milton, at an estimated cost of $99,935.
>
> A portion of this project, that relating to the new mouth and a jetty on the north side, at an estimated cost of $33,330 was adopted in the river and harbor act of March 2, 1907. With the funds provided by this act the new entrance was dredged across Lewes Cape and the jetty built, completing the project. In 1908–9 the jetty was repaired and reinforced with additional stone filling. With the appropriation of $5,000 made by the act of June 25, 1910, and of $10,000 made by the act of February 27, 1911, the channel in the river was redredged to a depth of 6 feet and a width of 40 feet from Milton, the head of navigation, downstream a distance of about 8 miles, and the work of reinforcing and making water-tight that portion of the jetty crossing

Lewes Sound was undertaken and is still in progress. It is expected that this work will be completed very soon, possibly during the current month.

It was proposed to apply the appropriation of $5,000 made by the river and harbor act of July 25, 1912, to starting a jetty on the south side of the entrance for maintenance of the channel across the bar and for protection from easterly storms. This subproject was not approved, as a south jetty was not included in the portion of the 1907 project adopted by Congress, although it was a part of the original plan.

A further appropriation of $5,000 for maintenance was made by the river and harbor act of March 4, 1913.

The absence of a south jetty to act as a breakwater has been largely responsible for the heavy maintenance charges for the north jetty, which was originally planned with the idea in mind that it would have such protection from the heavy easterly storms.

From the junction of the Broadkill River and Lewes River to Milton the stream is in very good condition, due to the recent restoration of the channel, and adequate for the present demands of commerce. There will be no need for more than maintenance in this section of the Broadkill until the mouth has at least an equal permanent depth.

The opening of the canal into Rehoboth Bay will complete a chain of inland waterways extending clear to Cape Charles, Va., upon which but a comparatively small amount of work is required to give a depth of 6 feet throughout. To be of full value to navigation, this canal, approved by Congress, and its related inland waterway to the southward must have a good outlet into Delaware Bay, and that is the mouth of the Broadkill.

The latest commercial statistics (1910) for the Broadkill give 10,929 tons, valued at $320,105. This would be largely increased with a dependable 6-foot depth at the mouth; for then a steamer sufficiently seaworthy for a trip that far down the bay could be put on a regular schedule, and the business is on the Broadkill waiting for a steamer.

5. The sketch[1] herewith shows the physical characteristics at the mouth. The tidal range is about 4 feet at the mouth.

6. There is a littoral movement of sand toward the mouth from the east. The flood tide carries some of this sand into the river and maintains a bar inside of the mouth. The ebb tide scours the sand from this bar and drops it in Delaware Bay, producing, in connection with the littoral movement, a broad bar across the mouth. Due to the opposition which this bar offers to the discharge from the river, the ebb flow is divided, part of it turning eastward along the shore and another part hugging the jetty to the end and then dispersing outward into the bay and westward along the shore.

7. It is thought that the jetty should be extended about 400 feet to prevent the westward dispersion of the flow and direct the discharge upon the bar, where now the available depth is only 3 feet. The entrance of sand from the east and the escape of the ebb toward the east should also be prevented. This can be done best by a jetty on the south side of the mouth. Probably a length of 500 feet would produce a marked improvement on the bar.

8. Since the last survey of the mouth was made, conditions have changed in many respects, due to the closing of the old mouth. A new survey is recommended as necessary to a proper study of existing conditions and the preparation of a plan and estimate.

9. The Broadkill River at present has very little commerce because of the great exposure at its mouth, which prevents small vessels from lying outside to await a favorable tidal stage for entering, and this is in spite of the fact that the river is navigable and taps a productive territory. At most of the small rivers flowing into Delaware Bay, such delays involve ordinarily only loss of time, and vessels which ground in attempting to pass the bars are not necessarily in danger

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[1] Not printed.

while lying on the bottom. At the mouth of Broadkill River there is generally a ground swell, and a vessel caught on the bar is in serious danger.

10. Although the chief obstruction to navigation in this river is this bar, the river itself is not worthy, in my opinion, of further improvement until its commerce outgrows the present facilities for navigation. The opening of the canal to connect Rehoboth Bay and Delaware Bay, soon to be accomplished under authority already given, will introduce a new element into the problem, a considerable traffic being expected.

11. This canal enters the Broadkill River near the mouth, and the physical conditions at the mouth will probably be somewhat ameliorated by the increased tidal flow through the canal when connected to Rehoboth Bay. Nevertheless, the sand movement and the splitting of the ebb flow from the river may be expected to continue until the sand is excluded and the ebb controlled by the construction of the south jetty and the extension of the north jetty.

12. To make the canal available with its prescribed depth of 6 feet, the mouth should have the same depth. Such an improvement may be expected to restore and increase the traffic on the river in addition. For this reason, and to reduce the cost of maintenance, I am of the opinion that the mouth only of the Broadkill River is worthy of further improvement, and I so report, and recommend a survey. It should be noted that this improvement was included in the original project approved by Congress, but that no appropriation was ever made for the jetty then proposed and now again recommended for the south side of the mouth.

13. No question of terminals, water power, or other correlated development is involved.

R. R. Raymond,
Major, Corps of Engineers.

[First indorsement.]

Office of Division Engineer, Eastern Division,
New York City, May 2, 1913.

To the Chief of Engineers, United States Army:

Concurring in the views and recommendation of the district engineer officer.

Wm. T. Rossell,
Colonel, Corps of Engineers.

[Third indorsement.]

Board of Engineers for Rivers and Harbors,
May 19, 1913.

To the Chief of Engineers, United States Army:

1. For reasons stated herein, the board concurs with the district officer and the division engineer in recommending a survey of the mouth of Broadkill River in order to determine the extent and advisability of the improvement, to include a study of sand movement and the possibility of its control by sand fences of cheap form of construction.

For the board:

W. M. Black,
Colonel, Corps of Engineers,
Senior Member Present.

SURVEY OF BROADKILL RIVER, DEL.

UNITED STATES ENGINEER OFFICE,
Wilmington, Del., December 11, 1913.

From: The District Engineer Officer.
To: The Chief of Engineers, United States Army
(Through Division Engineer.)
Subject: Survey of Broadkill River, Del.

1. The survey of Broadkill River, Del., was made under my direction during July, 1913, in compliance with Engineer Department letter dated May 28, 1913.

2. The field work was done by Mr. William E. Snyder, junior engineer (surveyor), under the supervision of Mr. G. W. T. Miller, assistant engineer, and included that part of the river from its mouth to its junction with Lewes River, as well as the Delaware Bay shore three-fourths of a mile southward and 1$\frac{3}{5}$ miles northward from the mouth. This survey covered all of the river that was necessary for the desired study of the problem of improvement when considered with data already available.

3. It also covered the old course of the river, now known as Lewes Sound, to secure data relating to the sand movements, as requested by the Board of Engineers for Rivers and Harbors.

4. The existing jetty is shown on the inclosed map by a heavy full line. Its outer end was constructed to withstand the sea and is in good condition, but the part across Lewes Sound is of lighter section, originally planned to be protected from the sea by a south jetty. This part of the jetty has required reinforcement and has also been backed by sheet piling to prevent the tides from washing through and undercutting it.

5. The existing general conditions are shown by the map.

6. The present defects of the channel from the viewpoint of the navigator are two, viz: Too small width opposite the river end of the jetty and too little depth across the bar near the outer end of the jetty to deep water in the bay.

7. There is along the bay shore a considerable littoral drift of sand from the south toward the north, and this is carried to the mouth of the river by the flood tide. A flood-tide channel of small depth lies just off the south point. What sand enters the river by this channel forms a bar adjacent to the point, the curved jetty serving to maintain a good channel along its own face during both directions of tidal flow.

8. During flood tide there exists a strong flow northward across the mouth, which smooths out the bar outside of the mouth and keeps it broad and flat.

9. The ebb tide, assisted by the fresh-water discharge, is able to maintain a depth of at least 7 feet at the gorge of the mouth, but deposits sand on the outer bar and expands and disperses outside of the point, so that there is not a useful channel across the outer bar.

10. On the south side of the mouth the bay shore is steep, exposing only a narrow strip of beach to the wind. Nevertheless, there is a wind-blown sand movement, causing low dunes, but not sufficient in volume to prevent a sparse growth of grasses and other vegetation. What sand blows inland is deposited close to the beach line, for the

marsh exists within 150 yards of the beach and shows only a gradual and slight encroachment of sand upon its mud and reeds.

11. The movement along the beach is more marked and the bar at the point is composed largely of sand blown from the beach. The sand bar at the point is well above the action of the water. Its upstream slope is very steep, and the river bed just above the point and thence upstream is mud and oyster rock, quite free from sand encroachment.

12. It is probable that a sand fence of cheap construction would check the formation of this bar on the point. Stunted cedars are available, which, spiked to buried sill logs, would probably form an efficient sand fence or hedge. Its length would not exceed 200 yards.

13. The sand carried to the northward of the mouth by the littoral current gives no further trouble.

14. There is a sand movement, due to wind, from the beach across Lewes Cape, which is the island formed by cutting the new mouth for the river. The cape is well covered with coarse vegetation, including stunted trees and bushes. The sand that blows across from the beach is caught by the water of Lewes Sound, which is steadily shoaling.

15. Dredging of the new mouth for the river caused the formation of a high sandy spoil bank along the north shore of the sound for about 600 yards adjacent to the jetty. This is gradually blowing back into the sound, aiding in the shoaling described.

16. The wind action on the north side of the mouth has little effect upon the river channel and does not require any sand catches.

17. It is believed that a satisfactory channel at the mouth of the river can be obtained best by extending the north jetty and constructing a parallel south jetty to direct the ebb discharge upon the crest of the outer bar, preventing dispersion of the river waters and at the same time cutting off the inflow of sand around the south point during flood tide. The wind-blown sand should be controlled as already described.

18. The map shows the locations suggested for the jetties to allow a cross section equal to that of the normal river cross section inside of the mouth.

19. I recommend that a project be adopted providing for an extension of the north jetty and the construction of a south jetty on the lines indicated, both jetties to be constructed in successive portions until a length is reached which produces the desired result. Sand fences or catches should also be provided for, and a certain amount of dredging at the gorge should be included to secure a depth of 6 feet and a bottom width of 100 feet up to Lewes River. The width of 100 feet is necessary, as small vessels use the lower river as an anchorage.

20. There is some clay in the point at the gorge and the proposed dredging will be required to secure the desired channel. As far as possible, the dredged material should be pumped into Lewes Sound to back up the jetty, cut off the tidal flow between the sound and the river, and do away with the present harmful eddy at the inner end of the jetty.

21. It is believed that an extension of the north jetty of 400 feet and the construction of 500 feet of the south jetty will produce a decided improvement, but that the approved project should permit

the extension of both jetties if found necessary, when funds can be appropriated.

22. The Broadkill River from the junction with Lewes River up to Milton, if maintained according to the present approved project, is adequate for present needs of commerce. It is possible that the improvement of the mouth will induce a growth of river traffic sufficient to justify improvement of the river to the depth of 7 feet, like other rivers in this part of the district, but at present the mouth is the point requiring improvement to make available the inland waterway from Rehoboth Bay to Delaware Bay, and no further improvement of the upper Broadkill River is recommended at present.

23. It is recommended that the jetties be of the type already employed at the mouth of the Broadkill River, viz, pile, brush, and stone. Where fully exposed to the sea the pile rows should be placed 10 feet apart, center to center, but at the shore end the width may be contracted to about 6 feet. The tops of the jetties should be 10 feet above mean low water.

24. The north jetty extension will probably cost about $24 per linear foot. The south jetty, being the shore end only of the structure, will probably cost about $20 per foot.

25. Estimate:

North jetty extension, 400 feet, at $24	$9, 600
South jetty, 500 feet, at $20	10, 000
Sand fence, 200 yards long	300
Dredging 30,000 cubic yards from the mouth to Lewes River, at 15 cents	4, 500
	24, 400
Superintendence, engineering, contingencies, 10 per cent	2, 440
Total	26, 840

26. No additional commercial statistics have been secured since my report of the preliminary examination. The commerce is largely prospective due to the fact that the inland waterway via Lewes River is not yet cut through to Rehoboth Bay.

27. I am of the opinion that the Broadkill River is worthy of improvement for the benefit of the commerce of the inland waterway to the extent indicated above, keeping in view the probability of an extension of the south jetty to a length of 1,500 or 1,600 feet.

28. No questions of water power or of terminals are involved in the present problem.

R. R. RAYMOND,
Major, Corps of Engineers.

[First indorsement.]

OFFICE OF DIVISION ENGINEER,
EASTERN DIVISION,
New York City, December 15, 1913.

To the CHIEF OF ENGINEERS:

Concurring in general in the views and recommendations of the district engineer officer.

W. M. BLACK,
Colonel, Corps of Engineers.

[For Report of the Board of Engineers for Rivers and Harbors on Survey see page 3.]

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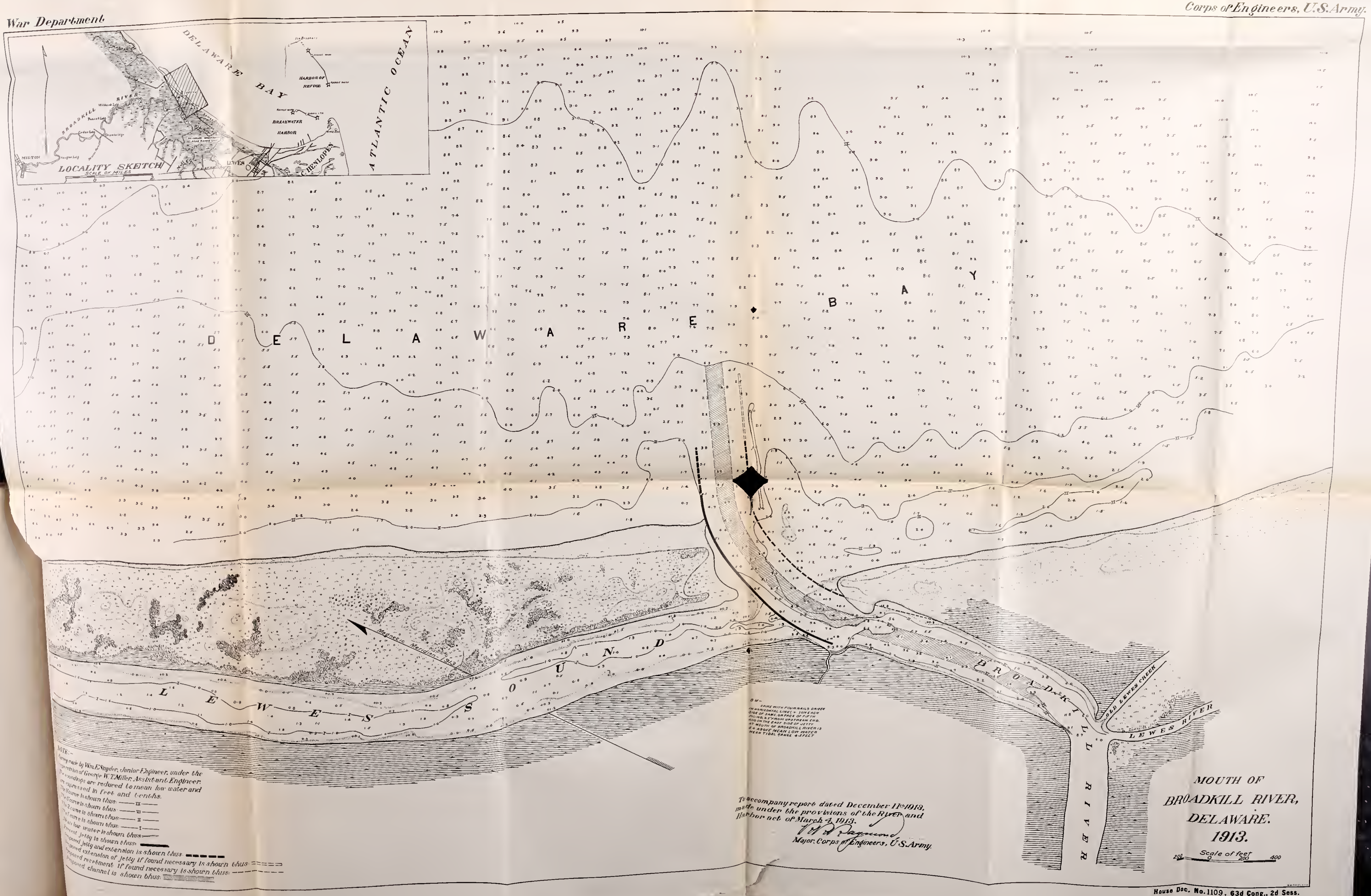
War Department

Corps of Engineers, U.S. Army.



NOTE:–
Survey made by Wm. E. Snyder, Junior Engineer, under the supervision of George W. T. Miller, Assistant Engineer.
The soundings are reduced to mean low water and are expressed in feet and tenths.
The 9 curve is shown thus: ——IX——
The 6 curve is shown thus: ——VI——
The 2 curve is shown thus: ——II——
The 1 curve is shown thus: ——I——
Mean low water is shown thus: ——
Present Jetty is shown thus: ▬▬
Proposed jetty and extension is shown thus: ▬ ▬ ▬
Proposed extension of jetty if found necessary is shown thus: ═════
Proposed revetment if found necessary is shown thus: — — — —
Proposed channel is shown thus: ▨

To accompany report dated December 11th 1913, made under the provisions of the River and Harbor act of March 4, 1913.

W. H. Raymond
Major, Corps of Engineers, U.S. Army.

MOUTH OF BROADKILL RIVER, DELAWARE. 1913.